

7.0 Natural Resources

This chapter provides background information on the natural resources associated with the Fernald Preserve and summarizes the activities in 2008 relating to these resources. Included in this chapter is a discussion of the following:

- Ecological restoration activities.
- Fernald Preserve site and OSDF inspections.
- Affected habitat areas.
- Threatened and endangered species.
- Cultural resources.

Much of the 1,050 acres (425 hectares) of the Fernald Preserve property is undeveloped land that provides habitat for a variety of animals and plants. Wetlands, deciduous and riparian (streamside) woodlands, old fields, grasslands, and aquatic habitats are among the site's natural resources. Over 900 acres of the site have undergone ecological restoration. Figure 7–1 shows the restoration project areas that have been completed. Some of these areas provide habitat for state and federal endangered species. Cultural resources, such as prehistoric archaeological sites, can also be found at the Fernald Preserve.

Monitoring of these natural and cultural resources is addressed in the Natural Resource Monitoring Plan, which is included in the IEMP. The Natural Resource Monitoring Plan presents an approach for monitoring and reporting the status of several priority natural resources to remain in compliance with pertinent regulations and agreements. The site and OSDF inspection process, which is defined in the LMICP, also helps to evaluate the condition of natural resources at the Fernald Preserve.

The approach for monitoring and maintenance of ecologically restored areas will be revised in 2009. DOE and OEPA signed a Consent Decree in November 2008 that settles a long-standing natural resource damage claim under Section 107 of CERCLA. As a result, the Fernald Natural Resource Trustees (DOE, OEPA, and the U.S. Department of Interior) have finalized the Natural Resource Restoration Plan (NRRP), which is Appendix B of the *Partial Consent Decree Resolving Ohio's Natural Resource Damage Claim against DOE* (State of Ohio 2008). The NRRP specifies an enhanced monitoring program for ecologically restored areas at the site. The Natural Resource Trustees will collectively evaluate restored areas by conducting field walkdowns and reviewing monitoring data. In addition, an enhanced wetlands mitigation monitoring program will be developed, along with the resumption of functional phase monitoring in restored areas.

7.1 Ecological Restoration Activities

The Fernald Preserve's mission of long-term stewardship under LM involves the establishment, management, and monitoring of ecologically restored areas across the site. In 2008, a major focus of activity was the construction of trails and overlooks in conjunction with opening the site to public access. Maintenance in ecologically restored areas included erosion repair, control of noxious weeds and invasive plants, and limiting impacts due to nuisance animals (e.g., deer and geese). Also, native landscaping around the newly completed Fernald Preserve Visitors Center was blended into the larger restored landscape through additional seeding and planting.

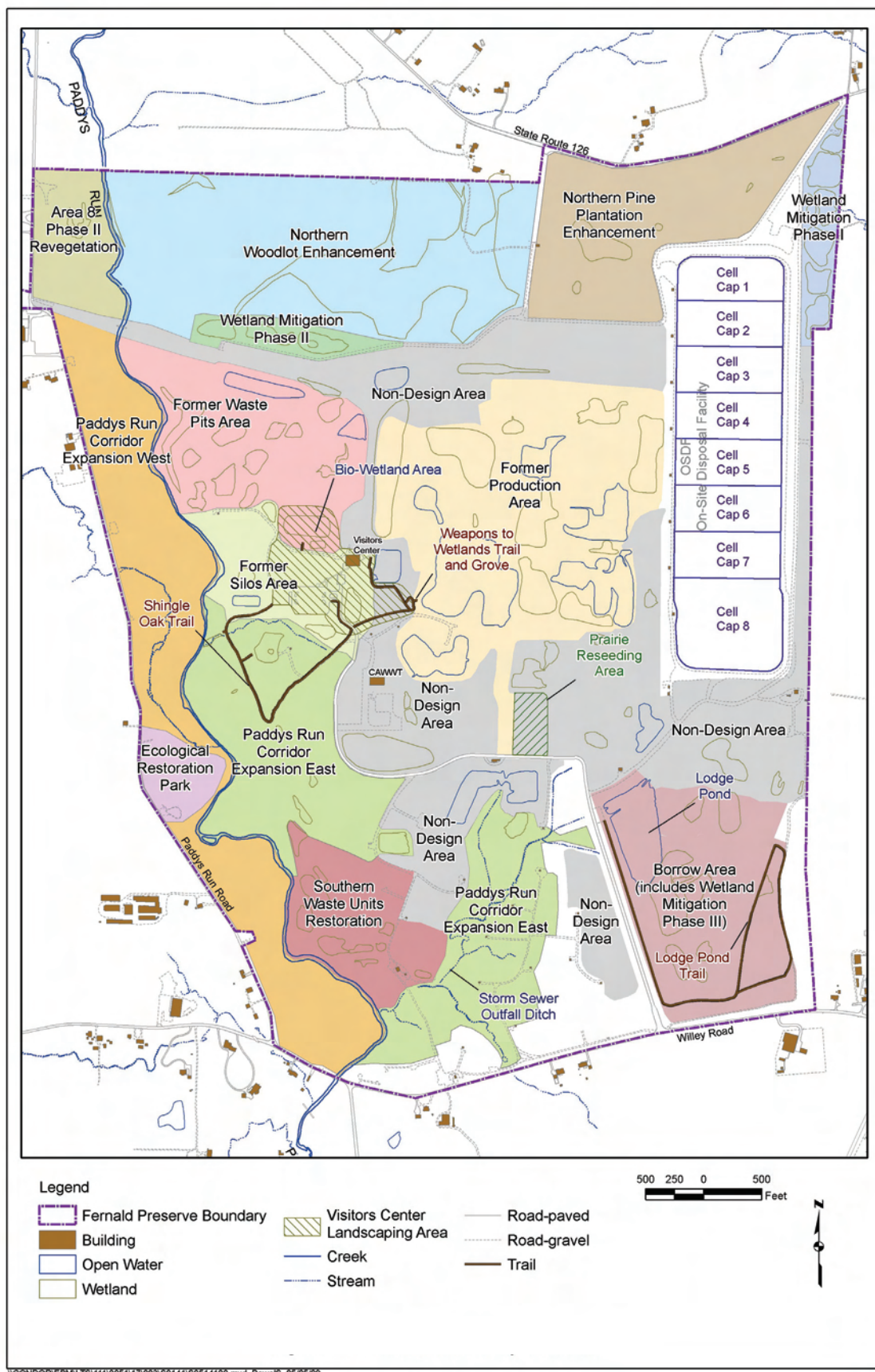


Figure 7-1. Restoration Project Areas

7.1.1 Trails and Overlooks Construction

Several trails and overlooks have been constructed to promote wildlife viewing and recreational opportunities at the Fernald Preserve. Figure 7–1 shows the location of trails at the site. The Lodge Pond Trail is a 1.4-mile path that loops around the Lodge Pond basin, and provides access to several restored wetlands and prairie areas. An observation platform at the trailhead is an excellent spot to see migrating waterfowl in the spring and fall. The Lodge Pond is located in the Borrow Area Restoration Project.

The Shingle Oak Trail is a 0.6-mile loop that starts and ends at either end of the Visitors Center parking lot. Restored forest, wetlands, and prairie pockets can be seen from the trail. An overlook of Paddys Run is also accessible from this trail.

The Weapons to Wetlands Trail provides access from the Visitors Center to the Weapons to Wetlands Grove, which was planted as a memorial to the stakeholders of Fernald. This 0.3-mile trail includes an observation deck that overlooks the former production area. In addition, a connector to the Shingle Oak Trail has been constructed off of this trail. Both the Weapons to Wetlands and Shingle Oak Trails were constructed with crushed stone. A short path to the Visitors Center Bio-Wetland was also constructed. This trail starts at the west end of the Visitors Center. The Bio-Wetland treats wastewater from the Visitors Center.

In addition to the trails described above, the Ecological Restoration Park was renovated and re-opened to the public in 2008. This small park located off of Paddys Run Road was originally constructed in 1998.

An expanded trail system is planned for 2009. Northern and western portions of the Fernald Preserve will be open for hiking and wildlife viewing.

7.1.2 Restored Area Maintenance Activities

In 2008, erosion repair work took place within the former production area and on the northern portion of the Lodge Pond. Rills had developed in several locations where rainwater had concentrated and flowed down slopes into ponds and drainages. The rills were re-graded and lined with stone to prevent additional erosion. Areas of disturbed soil were reseeded with native grasses and wildflowers. Where possible, coconut-fiber matting was used instead of stone.

Spot spraying with a broad-leaf herbicide, in conjunction with mowing and manual cutting, was used to control Canada thistle and other noxious weeds across the site. Manual cutting, followed by herbicide application to the stumps, was also used to remove bush honeysuckle along the western property boundary (along Paddys Run Road) and from the understory of a wooded section along the east side of Paddys Run near the Visitors Center parking lot and along the Shingle Oak Trail. This species is a nonnative invasive shrub that crowds out more desirable native species. In some of the wooded areas, honeysuckle had been mechanically removed in the past, and herbicide was applied in 2007 to re-sprouting shrubs. Inspection of these wooded areas in 2008 showed that little regrowth was occurring.

The primary nuisance animals on site are white-tailed deer and Canada geese. Existing deer-exclosure fencing was maintained sitewide. Major repairs were needed to fencings in some areas following the high winds from Hurricane Ike in September 2008. In addition, trees installed as

part of landscaping for the Visitors Center and the new trails system were “caged” with welded wire fencing to deter deer from rubbing or browsing.

Canada geese are an ongoing concern at the Fernald Preserve. The goose hazing program that was initiated in 2007, using trained border collies to harass the geese, was continued in 2008. The dogs, which are brought onto the Fernald Preserve by their handlers, actually try to herd the geese, but the geese see the dogs as predators and fly off, from both land and water. The goal is to keep the geese out of areas that have been seeded so that the vegetation has time to become established. Once the grasses become tall, the geese will no longer be attracted to those areas. A second goal is to make the geese too uncomfortable to want to nest at the Fernald Preserve.

Landscaping around the Fernald Preserve Visitors Center and associated trails involved the installation of native trees, shrubs, wildflowers, and wetland plants, along with prairie seeding. Over 1,800 plants were installed as part of this effort. The use of native vegetation in the landscaping helped to gain Leadership in Energy and Environmental Design Platinum certification for the Visitors Center. It was also used to tie the Visitors Center into the larger context of ecological restoration across the site. The extensive use of prairie seeding was also instrumental in accomplishing this. About 40 acres of native grasses and wildflowers were seeded in 2008. This includes several areas near the Visitors Center, along with an additional portion of the “non-design area” along the Visitors Center access road. Non-design areas are indicated on Figure 7–1. These are areas that were ecologically restored using general guidelines for fieldwork instead of detailed designs.

7.1.3 Ecological Restoration Monitoring

Implementation monitoring efforts in 2008 focused on a continued evaluation of herbaceous cover for several areas across the Fernald Preserve. The monitoring areas investigated in 2008 include the Main Drainage Corridor within the Former Production Area, along with the Former Silos Area, the Former Waste Pits Area, and a number of Non-Design Areas (Figure 7–2). These areas did not meet the goals established for herbaceous (grass and wildflower) vegetation in 2007. Vegetation goals include reaching 90 percent total cover and 50 percent native vegetation. To assess total cover, field personnel use “cover classes” to estimate a range of cover for a given area. An area with an average cover class of 5.0 or better is generally considered to have acceptable total cover. For native species, two values are calculated: native species composition and relative frequency of native species. The number of native plant species sampled within a given area is divided into the total number of species to get a percentage of native species composition. The relative frequency of native species is a way to evaluate how often native plants are sampled.

Table 7–1 shows the data summary for herbaceous cover sampling. The findings from 2008 showed some improvement over 2007 with respect to total cover. For native species composition and relative frequency of native species, not much improvement was seen, except for the Borrow Area–West monitoring sub-area and the Rail Area. Some areas actually decreased in native composition. Since the total cover generally increased from 2007 to 2008, the decrease in native species can probably be attributed to increased presence of weedy annuals. The poor soil conditions that were previously observed, coupled with a second year of late summer/fall drought, continue to hinder establishment of prairie in some areas. As described in Section 7.1.2, several locations were reseeded in 2008. It is anticipated that additional areas may require work to amend soil and seed in 2009. DOE will consult with the Natural Resource Trustees on additional seeding and implementation-phase monitoring in 2009.

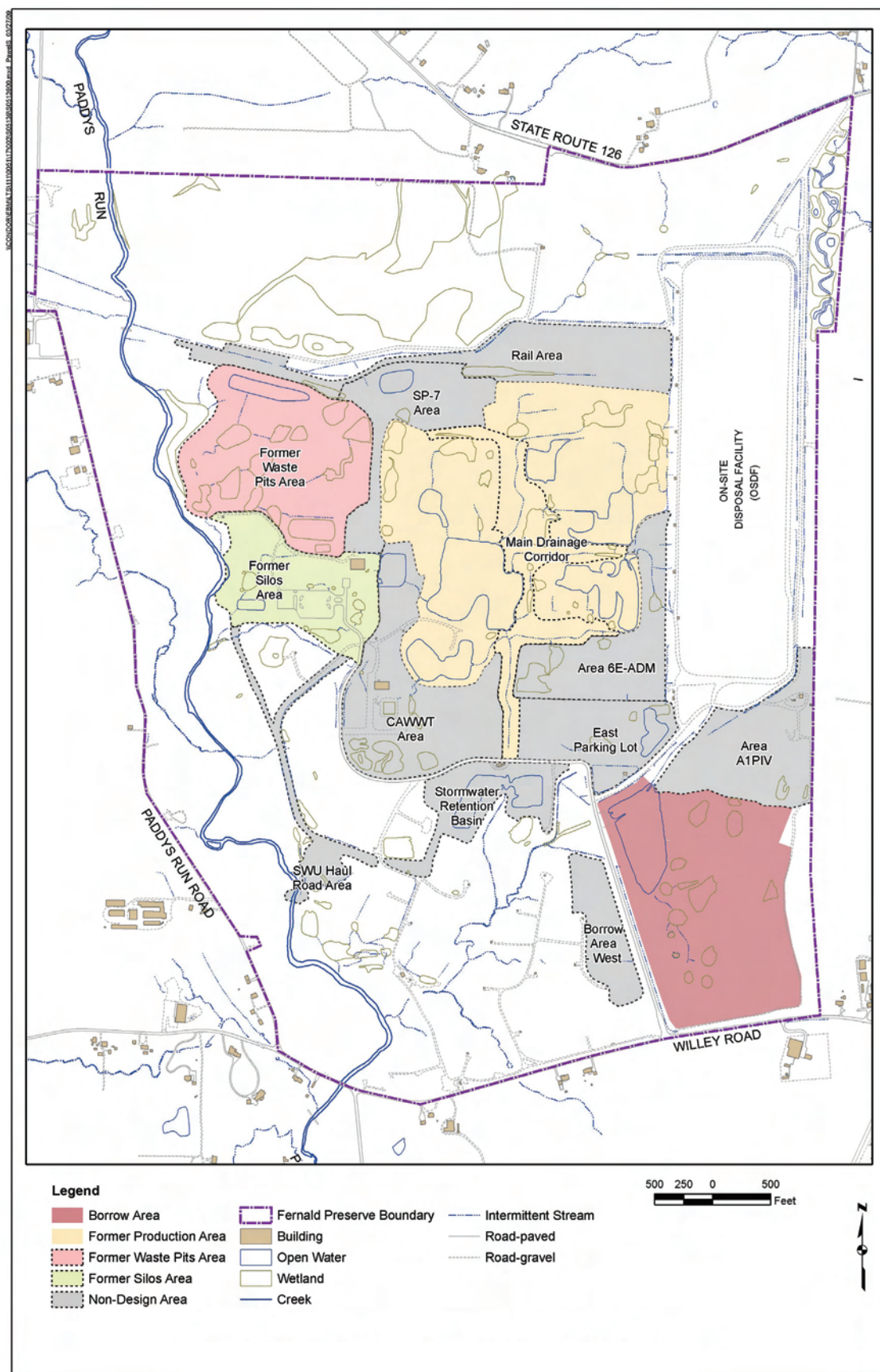


Figure 7-2. Herbaceous Cover Monitoring Sub-Areas

Table 7–1. Data Summary for Herbaceous Cover Sampling

Restoration Area	Monitoring Sub-Area	Average Cover Class		Native Species Composition (%)		Native Relative Frequency (%)	
		2007	2008	2007	2008	2007	2008
Former Production Area	Main Drainage Corridor	2.2	4.4	53	48	50	53
Non-Design Area	Storm Water Retention Basin	3.8	4.6	47	42	48	40
Non-Design Area	East Parking Lot	2.6	4.4	42	35	38	41
Non-Design Area	Area A1PIV	4.2	4.6	33	44	37	39
Non-Design Area	Areas 6E-ADM	2.8	3.6	50	28	46	36
Non-Design Area	Rail Area	2.6	2.8	29	40	33	45
Non-Design Area	CAWWT Area	3.4	5.2	25	45	40	42
Non-Design Area	Borrow Area–West	2.8	5.0	31	50	31	44
Non-Design Area	SWU Haul Road Area	2.4	5.0	50	44	52	44
Non-Design Area	SP-7 Area	4.0	4.4	30	25	27	27
Silos Area	Silos Area	3.0	2.8	18	50	21	50
Waste Pits Area	Waste Pits Area	2.2	4.0	40	47	59	50

Cover Class:

0 = 0%

1 = 2–4%

2 = 5–24%

3 = 25–49%

4 = 50–74%

5 = 75–89%

6 = 90–100%

Ecological restoration monitoring has been divided into two phases: the implementation phase and the functional phase. Implementation-phase monitoring is conducted to ensure that restoration projects are completed as intended in their designs. This effort involves the mortality counts and herbaceous cover estimates that are conducted after a project is completed. Functional phase monitoring is more general and considers projects in terms of their contribution to the ecological community as a whole. This is accomplished by comparing projects to pre-remediation baseline conditions and to ideal reference sites. Mortality and herbaceous cover thresholds are described in the *2002 Consolidated Monitoring Report for Restored Areas at the Fernald Closure Project* (DOE 2003b). Functional monitoring was suspended in 2005, as negotiations between the Natural Resource Trustees progressed. With final settlement reached in fall 2008, DOE will resume functional phase monitoring in 2009.

Water levels and water quality monitoring continued in 2008 for constructed wetlands in the Phase II Wetlands Mitigation Project and the Borrow Area. Decisions regarding future monitoring of mitigation wetlands at the Fernald Preserve will be determined by the Fernald Natural Resource Trustees. A path forward for wetlands mitigation monitoring was included in the final NRRP.



The compass plant (Silphium laciniatum) is one of many prairie wildflowers that are becoming established at the Fernald Preserve.

7.2 Fernald Preserve Site and OSDF Inspections

The LMICP sets out a routine inspection process for both the site and the OSDF. Inspections are conducted quarterly with joint participation from DOE and the regulators. Inspections document evidence of unauthorized uses of the site, the effectiveness of institutional controls, and the need for repairs. Ecologically restored areas are evaluated for the presence of noxious weeds, erosion, the condition of vegetation, and signs of damage from nuisance animals. Findings in 2008 focused mainly on noxious weeds, debris, erosion, and areas of sparse vegetation. In some areas, trash associated with yard waste compost soil amendments is an issue. The material is not contaminated, nor does it impact ecological restoration; however, it is not aesthetically pleasing. Field personnel have worked to clear some of the affected areas and will continue with this effort in 2009.

For the OSDF, the vegetated cap is walked down and evaluated to ensure that the integrity of the cap is maintained. Erosion rills, holes from burrowing animals, noxious weeds, settlement cracks, and other indications that there may be an issue with the proper functioning of the cap are flagged and repaired. In 2008, there were no signs that the integrity of the cap had been compromised in any way. Findings consisted mainly of minor erosion repair, presence of noxious weeds, and animal burrows.

Extensive erosion repair efforts were conducted around the Cell 1 cap in the spring of 2008. A number of small erosion rills developed through the winter within the reseeded area. As part of the repairs, mulch berms were added in several locations to prevent additional erosion.

Subsequent inspections have shown that this approach appears to be working. Vegetation is becoming re-established on the Cell 1 cap, and erosion has been much reduced. Additional work on the OSDF in 2008 included improvements to the surface water drainages on the western side of Cells 5 through 7.

7.3 Affected Habitat and Inspection Findings

During remediation, DOE and the natural resource trustees tentatively agreed that it would not be necessary to quantitatively assess habitat affected by remediation because DOE would be conducting natural resource restoration on approximately 900 acres (364 hectares) of the Fernald Preserve. A summary of the year's habitat impacts is presented below.

With large-scale remediation complete, the potential for unanticipated habitat impacts is limited. Nevertheless, impacts may occur during construction or maintenance activities. In 2008, no large areas of restored habitat were affected. Approximately 3 acres (1.2 hectares) of land was re-graded as part of the Visitors Center Bio-Wetlands construction; however, the land that was cleared was not yet established with native vegetation. One patch of shrubs within the former production area was relocated in order to install the geothermal lines to the Visitors Center. Approximately 20 shrubs were relocated, with some resulting mortality. The only additional impacts to ecologically restored areas were associated with access to erosion repair areas and trail construction.

7.4 Threatened and Endangered Species and Species Inventories

Sloan's Crayfish—The state-listed threatened Sloan's crayfish (*Orconectes sloanii*) is found in southwest Ohio and southeast Indiana. It prefers streams with constant (though not necessarily fast) current flowing over rocky bottoms. A large, well-established population of Sloan's crayfish is found at the Fernald Preserve in the northern reaches of Paddys Run.

Indiana Brown Bat—The federally listed endangered Indiana brown bat (*Myotis sodalis*) forms colonies in hollow trees and under loose tree bark along riparian (streamside) areas during the summer. Excellent habitat for the Indiana brown bat has been identified at the Fernald Preserve along the wooded banks of the northern reaches of Paddys Run. The habitat provides an extensive mature canopy of older trees and water throughout the year. One Indiana brown bat was captured and released on the property in August 1999.

Running Buffalo Clover—The federally listed endangered running buffalo clover (*Trifolium stoloniferum*) is a member of the clover family whose flower resembles that of the common white clover. Its leaves, however, differ from those of white clover in that they are heart-shaped and a lighter shade of green. Running buffalo clover has not been identified at the Fernald Preserve; however, because running buffalo clover is found nearby in the Miami Whitewater Forest, the potential exists for this species to become established at the site. The running buffalo clover prefers habitat with well-drained soil, filtered sunlight, limited competition from other plants, and periodic disturbances. Suitable habitat areas include partially shaded former grazed areas along Paddys Run and the storm sewer outfall ditch.

Spring Coral Root—The state-listed threatened spring coral root (*Corallorhiza wisteriana*) is a white and red orchid that blooms in April and May and grows in partially shaded areas of forested wetlands and wooded ravines. This plant has not been identified at the Fernald Preserve; however, suitable habitat exists in portions of the northern woodlot.

Cave Salamander—The state-listed endangered cave salamander (*Eurycea lucifuga*) is slender, red to orange with irregular black dots. It is found in caves, springs, small limestone streams, outcrops, and old springhouses where groundwater is present. It has only been documented in Ohio in Hamilton, Butler, and Adams counties. Suitable habitat within the Fernald Preserve is limited, but populations have been observed just north of the site.

Cobblestone Tiger Beetle—The state-listed threatened cobblestone tiger beetle (*Cicindela martinipennis*) is recognized by its olive-gray back, white sides, and red abdomen. It's found on large gravel bars on medium-sized rivers. Populations have been recorded east of the Fernald Preserve along the Great Miami River.

The Endangered Species Act requires the protection of any federally listed threatened or endangered species and any habitat critical for the species' existence. Several Ohio laws mandate the protection of state-listed endangered species as well. Since 1993 a number of surveys have been conducted to determine the presence of any threatened or endangered species at the site. As a result of these surveys, the federally listed endangered

Indiana brown bat and the state-listed threatened Sloan's crayfish have been found at the Fernald Preserve. In addition, suitable habitat exists for the federally listed endangered running buffalo clover, the state-listed threatened spring coral root, the state-listed endangered cave salamander, and the state-listed threatened cobblestone tiger beetle. None of these species have been found on the site, but their habitat ranges encompass the Fernald Preserve. Figure 7–3 shows the potential habitats for these species. According to provisions in the IEMP, any threatened or endangered species habitat will be surveyed prior to any construction activities. If threatened or endangered species are present, appropriate avoidance or mitigation efforts will be taken.

To avoid impacts to Indiana brown bat and Sloan's crayfish habitat, DOE and the regulatory agencies agreed to keep the former rail trestle that crosses Paddys Run in place. The *Final Operable Unit 3 Fact Sheet—Beneficial Reuse of Clean Buildings and Structures at the United States Department of Energy* (DOE 2006a) documents this decision. During the evaluation process it was determined that the train trestle may be used to enhance bat habitat at the Fernald Preserve. Several modifications to the trestle were made, including closing gaps between rail ties and installing specially designed bat houses. Bat activity was monitored through the breeding season in 2008. A number of bats have been observed in the vicinity of the trestle. The bats were not captured, so positive identification was not possible. Indiana brown bat and Sloan's crayfish habitat will continue to be protected as part of legacy management activities.

A fish and crayfish inventory was conducted with participation from a local high school science class in fall 2008. In addition to identifying a diverse assemblage of fish (20 species), the students made an interesting finding. Sloan's crayfish were documented within the northern reach of Paddys Run, which is their historical on-site range; however, several Sloan's crayfish were also observed in the SSOD. The presence of Sloan's crayfish in the SSOD is a first for the Fernald Preserve, and suggests an expanding range for the crayfish on site. The use of the SSOD for passive groundwater infiltration may have the added benefit of enhancing the stream habitat for Sloan's crayfish.

DOE is participating in several bird data-collection efforts. Information on birds breeding at the Fernald Preserve is provided to the Ohio Breeding Bird Atlas. In 2008, over 100 species of birds were recorded as probable or confirmed breeding at the site, and 85 species were confirmed nesting. The large prairie areas that surround the open water and wetlands support significant numbers of breeding grassland species, including those listed as species in decline by the National and Ohio Audubon Societies. Species observed include northern bobwhite, dickcissel, grasshopper sparrow, and eastern meadowlark. During the National Audubon Society's 2008 Christmas Bird Count, over 1,000 birds were observed using the Fernald Preserve, representing 34 species. The site routinely holds close to 1,000 waterfowl during the spring and fall migrations.

7.5 Cultural Resources

The Fernald Preserve and surrounding area are located in a region of rich soil and many sources of water, such as the Great Miami River. Because of its advantageous location, the area was settled repeatedly throughout prehistoric and historical time, resulting in richly diverse cultural resources. In summary, 148 prehistoric and 40 historic sites have been identified within 1.24 miles (2 km) of the Fernald Preserve.

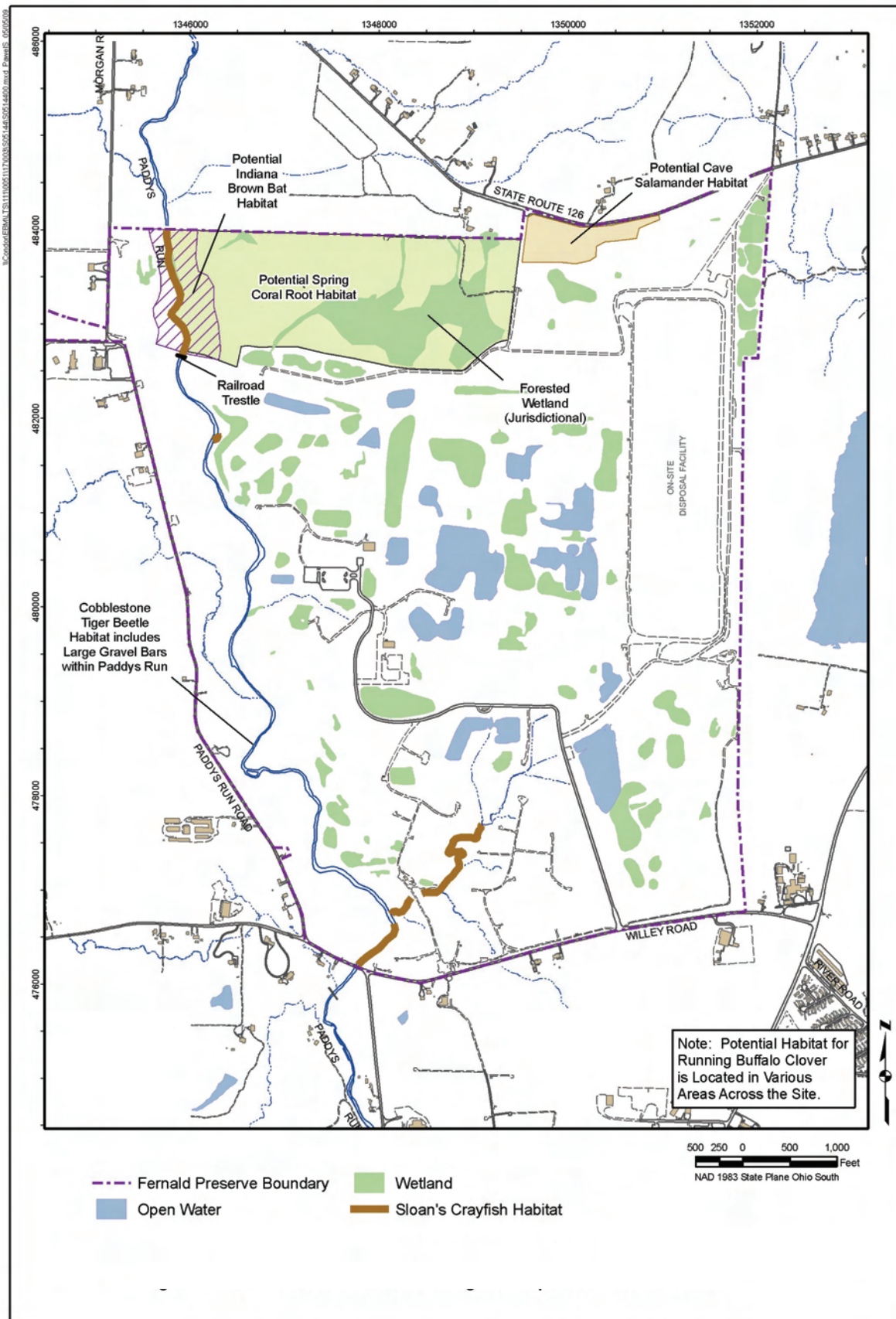


Figure 7-3. Threatened and Endangered Species Habitat Areas

Several laws have been established to protect cultural resources. The National Historic Preservation Act requires DOE to consider the effects of its actions on sites that are listed or eligible for listing on the National Register of Historic Places. The Native American Graves Protection and Repatriation Act (43 CFR 10) requires that prehistoric human remains and associated artifacts be identified and returned to the appropriate Native American tribe.

To comply with these laws, DOE conducted archeological surveys prior to remediation activities in undeveloped areas of the Fernald Preserve. Figure 7–4 shows the areas of the Fernald Preserve that have been surveyed. These surveys have resulted in the identification of six sites that may be eligible for listing on the National Register of Historic Places. None of these sites were affected by construction activities, and no additional surveys were required in 2008.

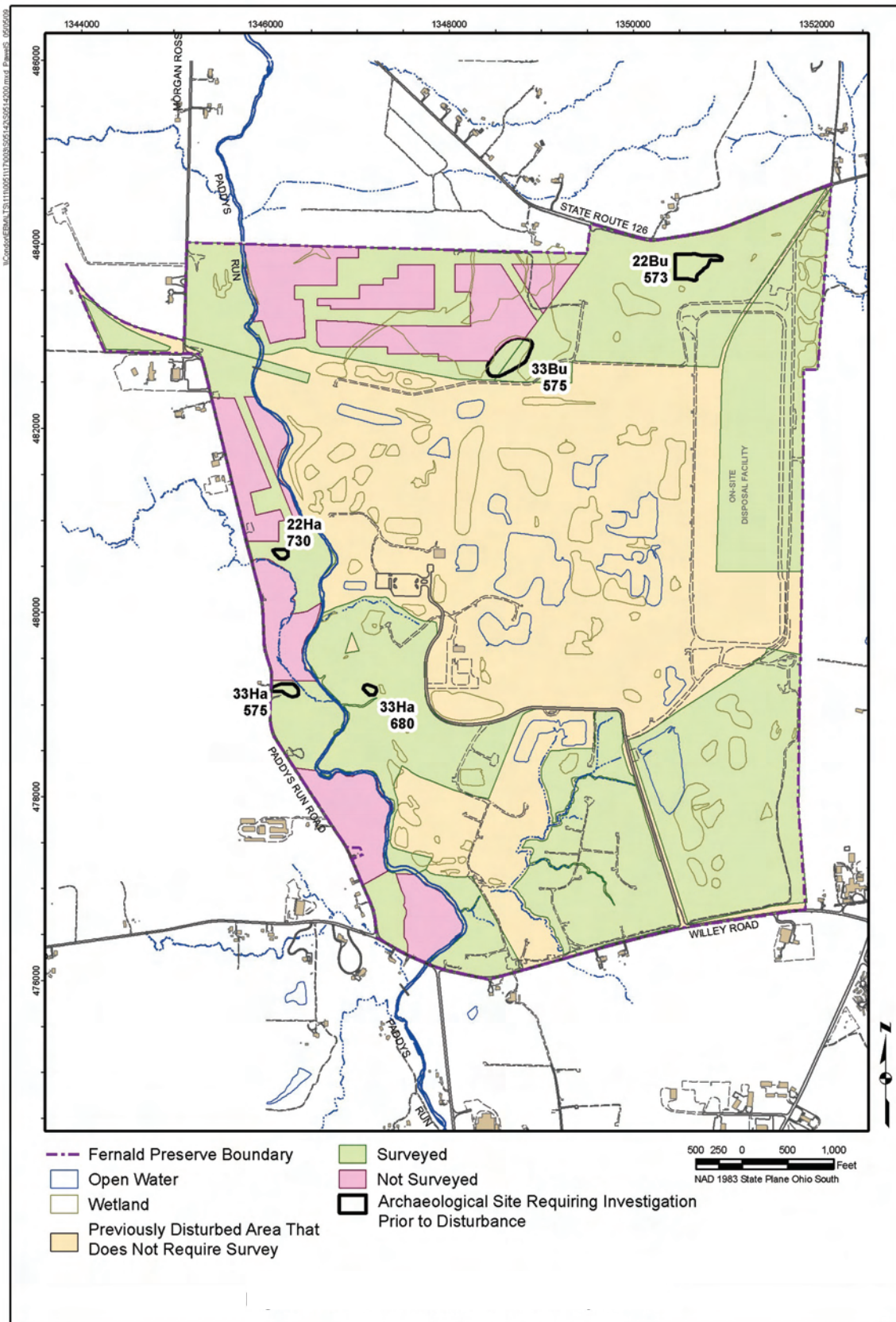


Figure 7-4. Cultural Resource Survey Areas